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Publication date:
2011

Document version
Early version, also known as pre-print

Citation for published version (APA):
Morton, R., Tyran, J-R., & Wengström, E. R. (2011). *Income and Ideology: How Personality Traits, Cognitive Abilities, and Education Shape Political Attitudes*. Department of Economics, University of Copenhagen.

Discussion Papers
Department of Economics
University of Copenhagen

No. 11-08

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ISSN: 1601-2461 (E)

Income and Ideology: How Personality Traits, Cognitive Abilities, and Education Shape Political Attitudes*

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January 27, 2011

Abstract

We find that cognitive abilities, educational attainment, and some personality traits indirectly affect ideological preferences through changes in income. The effects of changes in personality traits on ideology directly and indirectly through income are in the same direction. However, the indirect effects of cognitive abilities and education often offset the direct effects of these variables on ideological preferences. That is, increases in cognitive abilities and education significantly increase income, which reduces the tendency of individuals to express leftist preferences. These indirect effects are in some cases sizeable relative to direct effects. The indirect effects of cognitive abilities through income overwhelm the direct effects such that increasing IQ increases rightwing preferences. For ideological preferences over economic policy the indirect effects of advanced education also overwhelm the direct effects, such that individuals with higher education are more likely to express rightwing preferences than those with lower education.

*Support for this research from the Carlsberg Foundation is gratefully acknowledged. We thank Ken Benoit, Greg Huber, and seminar participants at Trinity College Dublin for helpful comments on an earlier draft. Of course, the usual caveat applies.

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1 Introduction

The relationship between income and ideology has been the subject of much investigation. Assuming that leftist positions imply greater redistribution of income to the poor, pure self-interest predicts that as an individual's income share increases, that individual is more likely to have rightwing preferences.[1] Indeed, a number of studies of the effect of income on ideological attitudes demonstrates such a relationship. For example, McCarty, Poole, and Rosenthal (2006) find that as individuals' relative incomes increase, they are more likely to support Republican candidates in the U.S.[2] Similarly, Van der Waal, Achterberg, and Houtman (2007) study 15 different countries [Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Great Britain, Ireland, Italy, the Netherlands, Norway, Switzerland, and the United States] for the period 1956 to 1990, finding that indeed income is a significant predictor of ideological preferences.[3]

Although income may have a direct effect on ideological preferences, it may also serve as a mechanism through which other variables, such as personality traits, cognitive abilities, and educational attainment affect ideology. Recent research has drawn increasing attention to the influence of factors such as personality traits and cognitive abilities on ideological preferences and the importance of including such factors in explaining individuals' ideological predispositions.[4] Usually these traits are included as additional independent explanatory factors in estimating the determinants of ideological preferences along with income and their influence is compared

[1] Although much of government redistribution is arguably directed toward middle class voters rather than the poor, it is generally accepted that left-leaning parties are more likely to redistribute income to the poor than right-leaning parties.

[2] See also the work of Bartels (2006), Brooks and Brady (1999), Gelman, Shor, Bafumi, and Park (2007), and Stonecash (2000).

[3] See also Brooks, Nieuwbeerta, and Manza (2006) for cross-sectional evidence on the relationship between class-based cleavages and voting.

[4] For work on the so-called Big Five personality traits which we explain in the next section see Alford and Hibbing (2007), Barbaranelli et al (2007), Caprara et al (1999, 2006), Carney et al (2008), Gerber et al (2010), Gosling, et al (2003), Jost et al (2003), McCrae (1996), Mehrabian (1996), Mondak and Halperin (2008), Rentfrow et al (2009), Riemann et al (1993), Schoen and Schumann (2007), Stenner (2005), and Van Hiel, et al (2000). For research on the relationship between cognitive abilities and ideology see Dreay, et al (2008a), Jost et al (2003), Kanazawa (2009, 2010), Kroth et al (2006), McCrae (1996), Saucier (2000), Schoon et al (2010), and Stankov (2007)].

to the influence of income treating each as independent factors as in Gerber et al. (2010). Yet, considerable evidence suggests that income levels are affected by personality traits and cognitive abilities, as well as educational attainment, which is often also included as an independent explanatory variable in these analyses.[5] Thus, income may be a mediating variable in the relationship between these individualized traits and educational levels and ideological preferences. Or it may suppress direct effects of these factors on ideological preferences, offsetting them.

Finding that income serves as a mediating variable (or suppressing variable if the effects through income offset the direct effects) for these individualized traits and educational levels can lead to more accurate estimates of the effects of these traits and education on ideology.[6] If income is a mediating or suppressing variable through which these individual differences affect ideology, then estimations which treat income as a separate independent variable misestimate the effects of these characteristics on ideological preferences by failing to measure their indirect effects through income. Gerber et al. recognize this problem and report an estimation excluding income and in other analyses interact income with measures of personality traits. However, measuring the indirect effect of these factors on ideology through income is interesting in itself as doing so may help us better understand the determinants of ideology and how changes in income either amplify or reduce the effects of these variables.

In this paper we consider explicitly whether income is a mediating or suppressing variable for individual traits and educational levels in determining ideological preferences using a large national internet survey. Our analysis is the first to consider the mediating and suppressing role of income in how these individual characteristics affect ideology and thus provides more accurate estimates of the effects of these factors on ideology by computing both their direct effects and their indirect effects through income. Our investigation also provides better estimates of the

[5]See Borghans et al (2008), Boudreau, Bosewell, and Judge (2001), Gelissen and de Graaf (2006), Judge Higgins, Thoresen, and Barrick (1999), and Seibert and Kraimer (2001) on the relationship between personality traits and income. See Gottfredson (1997, 2003), Jensen (1980, 1998), Schmidt and Hunter (2004), and Strenze (2007) on the relationship between cognitive abilities and income. See Tsai (2010) and Verdugo and Verdugo (1989) on the relationship between educational attainment and income.

[6]See Shrout and Bolder (2002) for a discussion of the difference between mediation and suppression. We explain how we distinguish between these different effects in Section III.

effect of income on ideology independent of personality traits, cognitive abilities, and educational levels. We find that indeed income serves as a mediating variable for some personality traits and lower educational levels and a suppressing variable for cognitive abilities and advanced educational attainment. That is, we find that the effects of some personality traits on ideology indirectly through income result in a small increase in the total effects of these traits on ideology, but that the effects of cognitive abilities and educational levels on ideology through income often offset the direct effects. In fact contrary to previous studies, we find that increases in intelligence, and in some cases advanced educational attainment, lead to more rightwing ideological preferences through the indirect effects on income which overwhelm the direct effects.

Our study is distinctive for the data we use to examine these relationships:

First, our income data is verified by taxation authorities rather than self-reported responses to broad income categories. Hence, we do not assign subjects midpoint estimates of income or some other arbitrary income level. To our knowledge no previous study of the relationship between income and ideology has used data with such detail and accuracy. We also have verified data from governmental authorities on residency, educational attainment, church membership, age, number of children, marital status, and gender of our subjects.

Second, our personality measures are taken from a 60 question battery unlike the shorter question batteries used in most other studies of the relationship between personality and ideology.[7] We thus provide a more accurate picture of personality differences.

Third, we have measures of subjects' cognitive abilities via an IQ test that has been shown to have a high degree of reliability. Therefore, we are able to have a broader picture of the relationship between a broad spectrum of individualized traits on ideological preferences by combining data on extensive personality measure with our IQ measure.

Fourth, our data, drawn from outside of the United States, tests whether the effects of personality on ideology, found by Gerber et al. for US voters, generalizes to other populations.

[7] Gerber et al (2010), for example, use only 10 questions.

Fifth, because our data is drawn from a country in which political issues are more centralized without significant variations at the regional level in educational systems, issues of concern to voters, social groupings, and other factors which can also affect ideological preferences, we are able to focus more exclusively on the effects of personality traits, cognitive abilities, education, and income on ideology and the mediating effect of income. Yet our results can be viewed as generalizable given that the nature of the educational system, economic conditions, and ideological divides are plainly characteristic of other western developed countries.

In the next section of the paper we summarize existing evidence on the roles played directly by personality traits, cognitive abilities, and educational attainment on ideology. We then discuss, in Section III, the evidence which suggests that income plays a mediating role for these variables – leading to indirect effects on ideology. Section IV contains our empirical analysis and in Section IV we present our conclusions and highlight the implications of our results for the understanding of the relationship between personality traits, cognitive abilities, income, and ideology and future research.

2 Personality Traits, Cognitive Abilities, and Educational Experiences as Sources of Ideological Preferences

True Ideological Preferences and Observed Measures

Political scientist Count Antoine Destutt de Tracy invented the term "ideology" in his publication of *Element d'Ideologie* in 1817 [see Hart (2002), Head (1985), and Knight (2006)] and its meaning has varied significantly across researchers in the almost 200 years since its birth. That said, Knight (2006), in her recent study of the use of the term, finds that political scientists have converged on several elements of a core definition of ideology. Knight argues that ideology has three essential components–coherence, stability, and contrast. Specifically, she finds that political scientists think of ideology as (page 619) "the way a system–a single individual or even a whole society–rationalizes itself. Ideologies may be idiosyncratic ..., impractical, or even delusional, but they still share the characteristics of coherence and temporal stability. The

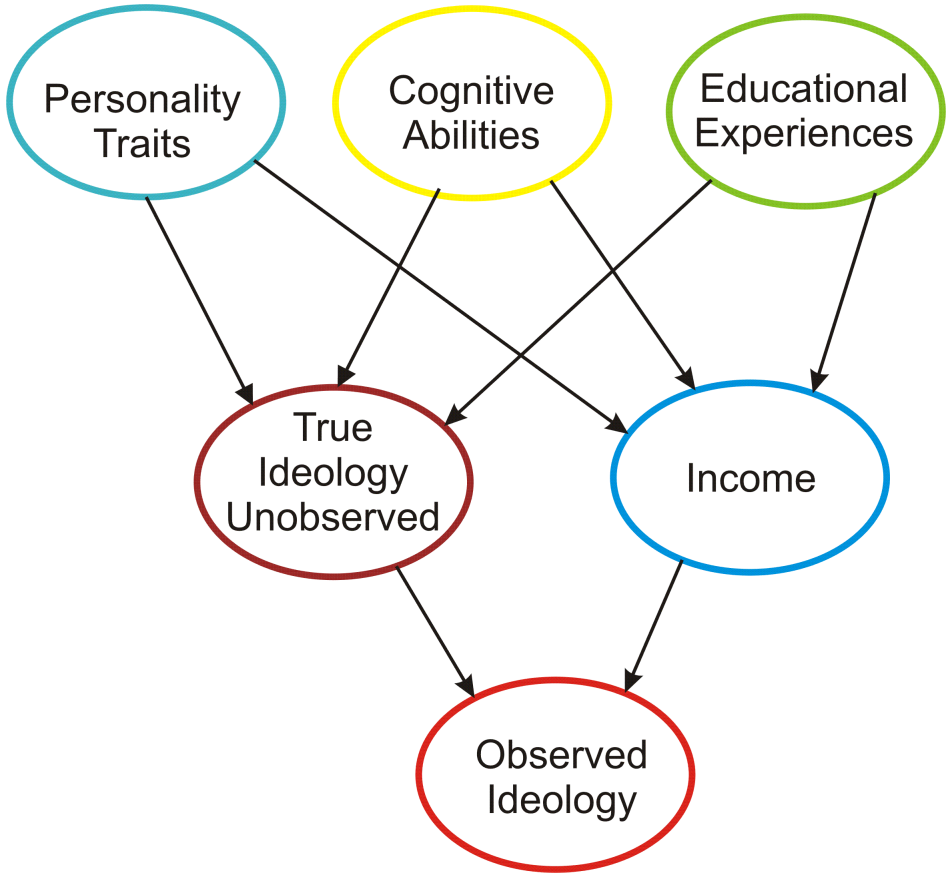
characteristic of contrast, or differentiation between alternative principles and their implications for government, is frequently implicit in analytic treatments of the term. At minimum, contrast requires two alternatives and some means to distinguish between them." Moreover, Knight finds that formal theorists and empirical researchers (page 625, italics in original) "have converged on a *spatial conceptualization of ideology* as a left-right ... continuum."

We distinguish between an individual's *true* underlying and unmeasurable ideological preferences and the *observed* or revealed empirical measures of ideological preferences given by the individual in response to particular questions such as which party an individual supports in a given political system, how an individual places him or herself on a specific 1-7 point scale, his or her views about the role of government in the economy, etc. We think of the true ideological preferences as a stable and coherent system that is determined by an individuals' innate characteristics and socialization experiences, as Knight describes. We expect that psychological traits, cognitive abilities, and educational experiences generally shape these true preferences primarily during an individual's early, formative years. We discuss the theoretical arguments and empirical evidence justifying our expectation on the influence of these factors on ideological preferences below.

When an individual chooses how to respond to a specific question asking about his or her ideological preferences, yielding an observed or revealed measure of ideology, we expect that the individual takes into consideration both his or her true ideological preferences and his or her current income as well as other factors. So, for example, if asked which political party an individual supports in an election, the individual considers his or her true ideological preferences, the positions of the parties in relation to those preferences, and possibly the effects of those positions on his or her material well being. Some individuals may not care at all about the effects of the policies on their personal incomes, while others may care a great deal. In this fashion, we expect observed ideological measures to be functions of personality traits, cognitive abilities, educational experiences, *and* income. Since income is also a consequence of person-

ality traits, cognitive abilities, and educational experiences as well, these characteristics have both direct effects on observed ideological measures by affecting the individual's unobservable true ideological preferences and indirect effects by affecting the individual's income. Figure 1 below illustrates our model of how these characteristics and income affect observed measures of ideology.

Figure 1: Hypothesized Relationship Between Individual Characteristics, Income, True Ideological Preferences, and Observed Ideological Measures



Below we present our specific predictions about the relationships between ideology and the individual characteristics of personality traits, cognitive abilities, and educational attainment based on previous theoretical and empirical research. These predictions concern the direct effects of such characteristics on observed ideological measures. We then discuss how income may also be affected by these same individual characteristics. If individual characteristics

increase (decrease) incomes, we hypothesize that the indirect effects of these characteristics will be to make individuals more (less) rightwing in their responses to ideological questions.

Personality and Ideology

As Borghans et al. (2008) document, considerable evidence suggests that personalities can be represented by five basic dispositional traits. These are typically called the Big Five: Agreeableness, Openness, Emotional Stability, Conscientiousness, and Extraversion. Agreeableness represents an individuals' interpersonal orientation and can range from being good-natured, trusting, and gullible to cynical, rude, suspicious, and manipulative. Openness refers to Openness to experience and curiosity about the desire for new experiences and ideas. Emotional Stability indicates the degree to which an individual is low in anxiety and has a high tolerance for stress. Conscientiousness is the extent that an individual is organized, persistent, and goal motivated. Extraversion measures an individual's sociability, warmth, assertiveness, and activity.

Most researchers in political science who study the effects of personality traits on political behavior contend that empirical evidence suggests that these traits have a genetic component and are relatively stable throughout adulthood. Gerber et al. (2010), provide an extensive review of the psychology literature on personality traits and remark (p. 104) that these traits are "theorized to be causally prior to traits that are influenced by both core personality traits and contextual factors" such as "values, attitudes (including political attitudes such as ideology), expectations about one's role in society, and personality goals." Borghans et al. (2008) also review the literature on personality traits and their use to predict individual economic preferences and choices. Although Borghans et al. find strong evidence of genetic influence in such traits and stabilization of traits in adulthood, they also find evidence that some personality traits, such as Conscientiousness, increase monotonically from childhood to late adulthood (page 976).

Since Adorno et al.'s (1950) work on the "authoritarian personality," researchers have argued that there is a link between personality traits and ideological preferences. Most of this research

has focused on outlooks, temperaments, and sensibilities that are associated with right-leaning preferences.[8] Recently researchers have begun to investigate the relationship between the Big Five core personality traits and ideological preferences.

Two of the Big Five appear to have robust effects on ideology: Conscientiousness and Openness, in opposite directions. Researchers have found that individuals who are more Conscientious are more likely to express an overall rightist ideology, vote for rightwing parties, and express rightist views on economic policies.[9] As Gerber et al. (2010) point out, these results are consistent with the view that those who are Conscientious are more likely to adhere to traditional norms and rules, and thus should not surprisingly support them. In contrast, individuals who are high on Openness have been shown to be significantly more likely to be left-leaning, vote for leftist parties, and support leftist economic policies.[10] The reasoning given for this relationship is that individuals who are high on Openness are more likely to be accepting of new ideas and proposals that overturn traditional and existing ones.

The other three personality traits have shown less consistent relationships with ideological preferences. Emotional stability has been sometimes shown to be positively related with rightwing preferences and voting for rightist parties.[11] Here, the rationale is that individuals who are more neurotic and worried will prefer more interventionist policies, particularly economic ones. Most research finds little relationship between Agreeableness or Extraversion and ideological preferences. The exceptions are Carney et al. (2008) who found in some samples that both were associated with rightist preferences and Gerber et al. (2010) who also find that Extraverts are more right-leaning. Furthermore, Gerber et al. find that although Agreeableness

[8]See for example Altemeyer (1981, 1996), Block and Block (2005), Jost et al (2003), Jost (2006), Lakoff (2006), McClosky (1958), and Pratto et al (1994).

[9]See Barbaranelli et al (2007), Caprara et al (1999, 2006), Carney et al (2008), Gerber et al (2010), Gosling, et al (2003), Mondak and Halperin (2008), and Stenner (2005). In contrast, Alford and Hibbing (2007) and Mehrabian (1996) do not find a significant relationship.

[10]See Barbaranelli et al (2007), Capara et al (1999, 2006), Carney et al (2008), Gerber et al (2010), Gosling, et al (2003), Jost et al (2003), McCrae (1996), Meharbian (1996), Mondak and Halperion (2008), Rentfrow et al (2009), Riemann et al (1993), Schoen and Schumann (2007), Stenner (2005), and Van Hiel, et al (2000).

[11]See Barbaranelli et al (2007), Carney et al (2008), Gerber et al (2010), Gosling et al (2003), and Mondak and Halperin (2008).

has no significant effect on overall ideology, it is likely to make one more leftist on economic attitudes, but rightist on social attitudes. Thus, they contend that the previous inconsistent and insignificant findings may be because of these countervailing effects on overall ideology.[12] Hirsh et al. (2010) also consider that there might be countervailing effects in Agreeableness. They divide Agreeableness into two aspects, Compassion and Politeness and find that the Compassion aspect of Agreeableness is associated with leftist preferences, but that the Politeness aspect is associated with rightist preferences.

In summary, previous research suggests that lower values of Openness and higher values of Conscientiousness, Emotional Stability, and Extraversion are positively related to overall rightist preferences, right-leaning positions on economic policy, and support for rightwing parties, while Agreeableness may be positively related to leftist positions on economic policy and rightist positions on social policy.

Intelligence and Ideology

Cognitive abilities are generally defined as characteristics such as the ability to comprehend complex ideas, adapt successfully to an environment, learn from experience, engage in reasoning, and use one's intellect to overcome obstacles. In contrast to personality traits which vary in composition across individuals such that one may be high in Agreeableness and but not very Conscientious, cognitive abilities have been shown to be highly intercorrelated and can be largely represented along a single dimension, which is typically called intelligence or "IQ."[13] Like personality traits, cognitive abilities can also change over an individual's life cycle, however, by middle childhood the ordinal ranking of these abilities across individuals is highly stable [see

[12]Gerber et al also show that the relationships between the Big Five traits and ideological preferences are significantly different between white and black Americans, suggesting that the relationships are affected by contextual differences in how white and black Americans differ in their views of the meaning of liberal and conservatism. That is, for example, for black Americans, liberal economic policies may be viewed as a social obligation rather than helping someone who lacked initative. They find that for black Americans, only Openness has the same significant effect on ideological preferences. Given the homogeneity of the population of Denmark from which our survey is drawn, we can safely assume that these differences in contextual views of liberalism are not significant for our sample.

[13]See Borghans et al (2008).

Schuerger and Witt (1989) and Hopkins and Bracht (1975)]. Although both the environment and genetics determine IQ levels, studies of adopted children find that the effects of the environment are primarily early in childhood [see Duyme, Dumaret, and Tomkiewicz (1999) and Beckett et al. (2006)] with less substantial effects as children age.

Higher cognitive abilities have been shown to be positively correlated with leftist ideological positions and negatively correlated with rightist positions [Deary et al. (2008a), Jost et al. (2003), Kanazawa (2009, 2010), Kroth et al. (2006), McCrae (1996), Saucier (2000), Schoon et al. (2010), and Stankov (2007)]. Dreary et al. (2008b) find that higher cognitive abilities are also associated with alternatives to the two major political parties in the United Kingdom (the Liberal and Green Parties).

Wilson (1973), Jost et al. (2003), and Stankov (2007) explain the relationship between lower cognitive abilities and greater rightist preferences as a motivated response to uncertainty or threat which is greater for individuals with lower cognitive abilities. Stankov (page 295) suggests that "the perceived threat may vary depending on cognitive level – sources of threat such as complexity, novelty, and ambiguity may be more threatening to those who score low as opposed to those who score high on cognitive tests."

Kanazawa (2009, 2010) proffers an evolutionary theory to explain the relationship between intelligence and ideology. He argues that in the human ancestral environment, most problems were recurrent adaptive ones and that the human brain consists of a large number of domain-specific evolved psychological mechanisms to solve these recurrent problems. In his view, general intelligence evolved as a domain-specific adaptation of individuals when they were confronted with novel, non-recurrent problems. The implication is that more intelligent individuals are better at solving problems that are evolutionary novel but not better in solving problems that are evolutionary familiar such as mating, parenting, interpersonal relationships, and wayfinding. Kanazawa contends (2009, page 541) that his theory further implies that "more intelligent individuals will be more likely to acquire and espouse evolutionarily novel preferences and values

than less intelligent individuals, while general intelligence will make no difference for the acquisition and espousal of evolutionary familiar values." Thus, he contends that his theory explains why the novel value of leftist preferences is more likely to be associated with higher intelligent individuals.

In summary, previous research suggests that cognitive abilities can be summarized by a single factor, called Intelligence, or IQ, and that higher levels of IQ are associated with support for more leftwing ideological positions and leftwing political parties.

Education and Ideology

Most studies of ideology, such as Gerber et al. (2010), find that individuals who are more educated are more likely to express leftist preferences, going back to the work of Kaiser and Lilly (1975) and McClintock and Turner (1967). There are various theoretical justifications given for this relationship; it may be that education undermines belief in a "natural social order" [Gabennesch (1972)] or that education instills democratic values in leftist-democratic societies [Weil (1985)]. However, evidence suggests that it is not just length of education, but the type of education, i.e. academic or vocational. For example, Nilsson et al. (1985) found that academic high school students were less rightist than vocational students.

In summary, evidence suggests that individuals with higher levels of academic education are more likely to express leftist preferences and support leftwing parties. In particular, we expect that individuals with vocational education or only basic education levels will be most rightwing and that as educational attainment increases beyond vocational training, leftist ideological preferences will increase as well.

3 On Income as a Mediating or Suppressing Variable

Personality Traits and Income

We now turn to how income may be affected by personality traits, cognitive abilities, and education. We first address the relationship between personality traits and income. As Borghans

et al. (2008) discuss, considerable evidence shows that personality traits can affect career success and as a consequence, income. Boudreau, Boswell, and Judge (2001), Gelissen and de Graaf (2006), Judge et al. (1999), and Seibert and Kraimer (2001) study the relationship between the Big Five and extrinsic career success. All of these studies demonstrate that high levels of Extraversion and high levels of Emotional Stability are positively related to success. The rationale for the effect of Extraversion on success is that Extraverts are more likely to be active, dominant, and ambitious and that these traits are valued and rewarded. Extraverts are furthermore argued to be more likely to enhance their careers, seek new challenges, and deal with unpleasant working conditions. The rationale for the effect of Emotional Stability on career success is that individuals who are less anxious and stressful are better able to deal with higher-level jobs that are complex and tense. Since both of these variables also have been shown to lead to more rightist ideological preferences, as reviewed above, these results suggest that the observation that higher income levels lead to more rightist ideological positions may simply reflect the personality trait differences.

Similarly, Gelissen and de Graaf as well as Seibert and Kraimer find that Openness has a negative effect on income. It is reasoned that individuals who are open to experience may be more likely to change occupations or be unhappy in traditional jobs. As we noted above, Openness is likely to lead to more leftist ideological preferences. Thus, as with Extraversion and Emotional Stability, the tendency of low income individuals expressing leftist ideological positions may simply reflect greater Openness rather than lower income levels.

Furthermore, Boudreau et al. and Judge et al. find that Agreeableness is also negatively related to career success. This may occur because more agreeable individuals are more likely to sacrifice their success to please others or the trait of Agreeableness is not highly valued where individuals are expected to be critical and judgemental as in some high level positions. As noted above, there is some evidence that Agreeableness leads to more leftist economic policy positions. Hence if Agreeableness also leads to lower incomes, the negative relationship between income and

leftist positions on economic policies may simply reflect higher levels of Agreeableness among low income individuals.

Theoretically we might expect that Conscientious individuals would be more likely to achieve success through hard work and persistence and thus earn higher incomes. Since Conscientious individuals are more likely to have rightist ideological positions, then it seems that high levels of Conscientiousness of high income voters might explain the income and ideological relationship as well. However, there is little evidence that Conscientiousness has a positive effect on income. Only Gelissen and de Graaf find a relationship between Conscientiousness and income. Furthermore, they find that women who are more Conscientious have less career success, although the effect is small. Thus, in contrast to the other four traits, Conscientiousness is not expected to explain the income and ideology relationship.

It is possible that job characteristics which affect one's environment may also have an effect on personality. However, Robins et al. (2001), Judge et al. (1999), and Costa and McCrae (1988) provide evidence that it is likely that the causal direction is primarily from personality to career outcomes. In particular, it appears that the growth in stability in personalities that occurs over time is due to a growing influence of genetics. The belief that genetics becomes more important is based on what is known as the "gene-environment correlation;" that is, as an individual ages, he or she is able to exert more control over his or her environment and individuals with similar genetic predispositions share similar environments [see Rutter (2006)]. Thus, it is reasonable to assume that personality traits have a greater effect on income than vice-versa, even though personality traits may change over time, particularly as one grows older. In our empirical analysis we control for the effects of age differences.

In summary, we expect that higher levels of Extraversion and Emotional Stability and lower levels of Openness will lead to both higher incomes and more rightist ideological preferences. Higher levels of Agreeableness will lead to more leftist economic policy positions and lower income levels. Hence, the direction of changes in these personality traits have the same predictable effects

on ideological preferences as their effects on income would imply. That is, those traits that lead one to be more rightwing, also lead one to earn higher income and some of what may appear to be an effect of income on ideological preferences may be caused by personality trait differences. However, we expect that Conscientiousness will have no mediating effect on ideology through income.

Intelligence and Income

Considerable scientific research has demonstrated that individuals with higher IQ scores earn higher income than those with lower scores [see Gottfredson (1997, 2003), Jensen (1980, 1998), and Schmidt and Hunter (2004)]. Nevertheless, there is some disagreement over the size of the correlation between the two with Jensen (1998, page 568) finding it is around 0.40 and Bowles et al. (2001) discovering only a 0.15 correlation. In a recent meta-analysis which corrects for some of the problems of independence and omitted variables in the previous work, Strenze (2007) found a correlation of 0.23. Although low, Strenze argues that the correlation should be viewed in context (page 415): "... other predictors ... are not doing better in predicting income, which demonstrates that financial success is difficult to predict by any variable. ... It should be noted that the correlation of .23 is about the size of the average meta-analytic result in psychology ... and cannot, therefore, be treated as insignificant." Strenze also finds evidence that suggests that the effect of intelligence on income is independent of parental socio-economic status.

Since higher intelligence levels lead to higher incomes as well as more leftist ideological preferences, we expect that the increases in income as a consequence of higher intelligence levels may reduce the effects of intelligence on ideological preferences.

Education and Income

The relationship between educational attainment and income is similarly considered established fact. Education is posited to increase individuals' abilities and skills, thereby leading them to better and higher paying jobs. Verdugo and Verdugo (1989, page 4) remark that "[a]

dominant paradigm in both sociology and economics suggests a positive relationship between education and earnings. Scholars from both fields suggest that educated workers earn more than their less educated counterparts because they are more productive." Yet, the relationship, as Verdugo and Verdugo point out, is sometimes not as simple as the paradigm would suggest. In particular, they show that overeducated workers often earn less than their adequately educated or undereducated counterparts. However, in a recent study Tsai (2010) shows that workers who are overeducated tend to also have lower ability or other unobserved characteristics that lead to overeducation. He argues that workers with low abilities are more likely to obtain an overeducated job since they are less able to perform the job for which they have received education. Once the heterogeneity in individual abilities is taken into account, Tsai finds that the wage differences between overeducated and adequately educated is negligible. As we have measures of individual cognitive abilities as well as educational attainment, we are able to control for such heterogeneity in our analysis.[14]

Since higher educational levels lead to higher income levels, as with cognitive abilities, we expect that the indirect effect of education on ideology through income to reduce the direct effect of education on ideological preferences. That is, we expect that as educational attainment increases, income levels will increase, leading to more rightwing ideological preferences.

4 Data and Empirical Models

Data

The data for our study comes from a paid survey conducted through iLEE (internet Laboratory for Experimental Economics) at the Center for Experimental Economics at the University of Copenhagen in spring 2008.[15] A random sample of 22,207 subjects were drawn based on socio-economic characteristics from the general voting-age population of Denmark, with the

[14]One might argue that educational attainment is a function of IQ as well. As we do not explicitly explore that possible relationship in our analysis, our results are best viewed as measuring the effect of educational attainment holding cognitive abilities constant and vice-versa.

[15]The internet platform is supported by the Carlsberg Foundation.

collaboration of Statistics Denmark (SD) a Danish governmental agency. SD sent hard-copy letters by regular mail, inviting participants to log into iLEE's webpage using a random ID number and to complete the survey within a week. Upon login subjects were informed that the study would take approximately 50 minutes and that they would only be paid if they completed the entire study. The survey was conducted in Danish. After completion of the survey, the choice data was sent to SD where it was matched by SD with the detailed socio-economic data (income, education, etc.). The data was then made available to the researchers in a fully anonymous format. Of the subjects, contacted, 3,584 logged into the survey, and 1,823 completed all the questions.

Our principal dependent variables are four questions on ideological preferences of the subjects, which together we label our Ideology Measures. All of the questions provided subjects with the option "Prefer not to answer." The first question related to voting behavior: "What party would you vote for if there was an election tomorrow?" The subject could choose one of the nine parties who were eligible for parliament in the 2007 elections, along with the options "Would not vote" and "Would vote blank." The nine parties were ranked on a scale from right to left, with 1 equally the most extreme rightist party (Danish People's Party) and 9 representing the most extreme leftist party (Unity List – Red – Green Alliance).[16] This variable is labeled *Party.* 1,893 subjects completed the *Party* question.

The remaining three questions were taken from the World Values Survey (1999). The second question was a classic ideology question in which the subject had to place herself on a left-right scale: "In political matters, people talk of 'the left' and 'the right.' How would you place your views on this scale, generally speaking?" A scale from 1 to 10 was presented with 1 representing extreme left and 10 representing extreme right. For our empirical analysis the

[16]The full ordering of the parties is as follows: 1 = Danish People's Party, 2 = Conservatives, 3 = Liberals, 4 = New Alliance, 5 = Christian Democrats, 6 = Social Liberals, 7 = Social Democrats, 8 = Socialist Peoples Party, and 9 = Unity List – Red – Green Alliance. The ranking was validated by Jørgen Goul Andersen, an expert on Danish political parties. The ranking also corresponds to rankings of the same Danish parties in Benoit and Laver (2006); Benoit and Laver exclude one new party which we include and include two old parties which we exclude.

scale was reversed such that 10 represented an extreme left position. The re-scaled variable is labeled *Leftist.* 2,028 subjects completed this question.

The third and fourth questions related to economic policy of the government. The third question concerned government responsibility for individuals' wellbeing. Subjects were presented with two opposing views placed on either end of a 1-10 scale and asked to place themselves on the scale in accordance with their own views. The two statements were: "People should take more responsibility to provide for themselves" and "The government should take more responsibility to ensure that everyone is provided for." These statements were placed at 1 and 10 respectively. We used answers to this question to create the variable labeled *Econ1* The fourth question concerned preferences for competition and had the same structure as the third question which we used to create the variable labeled *Econ2.* The two opposing statements were: "Competition is good. It stimulates people to work hard and develop new ideas" and "Competition is harmful. It brings out the worst in people." Again, the first statement was placed at 1 and the second statement was placed at 10. 2,107 subjects completed *Econ1* and 2,106 subjects completed *Econ2.*

After completion of the these questions, subjects completed a Big Five personality test and an IQ test. We used the Big Five personality test NEO PI-R Short Version and the IQ test I-S_T 200R which are copyrighted and administered by the Danish Psychological Publishing Company (Dansk Psykologisk Forlag). The Danish NEO-PI-R Short Version consists of five 12-item scales measuring each domain. The 12 items for each domain are chosen from the original 48 items (of the full NEO-PI-R test) as follows: for each facet the two items (out of eight) with the highest correlation with the total factor score are chosen (this is different from the American 60-item version of NEO-PI-R, called NEO-FFI, where the 12 items with the highest correlation with the total factor score is picked, without regard to which facets the single items belong to). In the Danish short version, all facets are therefore represented equally within each domain. The Danish short version has been shown to be highly correlated with the long test such that Costa

and McCrae (2004) conclude that if one only wants to examine the Big Five factors, one could just as well use the short test instead of the full version.[17]

In the Big Five test subjects were presented with 60 statements and asked to state whether they agree or disagree with each on a 0-4 scale which contained the options "Strongly disagree," "Disagree," "Neutral," "Agree," and "Strongly agree." Using these answers we constructed the variables that measured the five personality traits, *BigFiveA* for Agreeableness, *BigFiveC* for Conscientiousness, *BigFiveE* for Extraversion, *BigFiveO* for Openness, and *BigFiveN* for Emotional Stability. In our analysis the first four of these variables, *BigFiveA, BigFiveC, BigFiveE, BigFiveO* are measured with higher values representing higher levels of the respective trait, but *BigFiveN* is measured with higher values representing lower levels of Emotional Stability (higher levels of Neuroticism).

In the IQ test subjects are presented with 20 questions or puzzles and asked to solve as many as possible within a 10 minute period. The IQ test we used is part of a more extensive test called "IST 2000 R". This test contains several modules and we chose to use a part that is a variation of Raven's Progressive Matrices. An advantage of The Raven's Progressive Matrices Test is that it does not depend heavily on verbal skills or other kinds of knowledge taught during formal education. The results from the IQ test were used to create a continuous variable measuring performance which we labeled *IQ*.[18]

After completing the personality and IQ tests, subjects were asked to provide their bank account numbers and were told that their payment would be transferred to them after the study was concluded.

The data from the survey was combined with demographic data from administrative registers of Danish governmental agencies. Our income data is from 2006 and refers to the logged value of total gross income of the individual (salary, pension, capital income, etc.) in thousand Danish

[17]The correlations between the short and long tests are as follows: 0.93 for Emotional Stability, 0.90 for Extraversion, 0.93 for Openness, 0.89 for Agreeableness, and 0.91 for Conscientiousness. These estimates are based on a sample of 600 observations, see Costa and McCrae (2004).

[18]We omitted subjects who scored less than 5 on the IQ test.

Kroner, which is labeled as the continuous variable *Income*. As noted above, our income data is unique for studies of the effects of income on ideology. We omitted individuals with negative values of income due to large capital losses. For robustness, we also considered truncating the data at the lower and upper percentiles, replacing the continuous variable with dummies and including a squared income variable. The qualitative results were robust to these variations.[19] We also include age, age squared, and age cubed, in order to capture nonlinear relationships between age and our dependent variables. As with income, we also tested the robustness of our results by replacing the continuous age variable with dummies.

Education levels are divided into six categories as follows: *EduBasic* for individuals who did not complete a high school degree, *EduHS* for individuals who completed or are in the process of completing an academic high school degree, but no advanced education; *EduVoc* for individuals who completed or are in the process of completing vocational education instead of attending an academic high school, and three variables for various levels for advanced university training: *EduAdv1* for individuals who have completed or in the process of completing some academic post-secondary education less than a Bachelor's degree, *EducAdv2* for individuals who have completed a Bachelor's degree, and *EducAdv3* for individuals who have completed or in the process of completing a Masters or Ph.D. degree. *EduVoc* was omitted in the empirical analysis and served as our baseline case since previous research has suggested that individuals with vocational education have the most rightwing ideological preferences. *Student* designated individuals who are currently studying and spanned all the education categories, depending on the extent that they had completed their education.

Other demographic variables included in the analysis whose names are self-explanatory include: *Female*, *Urban, Parttime, Retired, Unemployed, Married,* and *Divorced*. We also include *Couple* for unmarried couples and *Church* for individuals who are members of the Danish

[19]Some might contend that it is wealth that affects ideology and that income is affected by wealth. Our income variable includes capital income so arguably measures wealth as well. We also have an independent measure of wealth that includes the value of many assests such as stockes and bonds, housting, and cash holdings at bank accounts. Including the weath varaible in our analysis does not change our qualitative results.

Lutheran Church. The Appendix summarizes the data used in the analysis and compares the sample to the Danish population 18 years old and older. In general the match is good, with a somewhat over-representation of middle-aged individuals who necessarily have more education and earn higher incomes.

Empirical Models

As argued above, our principal goal is to determine the extent that income serves as a mediating or suppressing variable for personality traits, cognitive abilities, and educational attainment in determining observed ideological preferences. In order to estimate the mediation or suppression effects, we used the following procedure. We first estimated four sets of seemingly unrelated regressions. In each set we estimated simultaneously two equations. In the first equation *Income* serves as the dependent variable. In the second equation one of the four ideological measures serves as the dependent variable, *Party, Leftist, Econ1,* or *Econ2.* For example, to determine the mediation effect of the Big Five personality traits for the ideological measure *Party* we estimated the simultaneously the following two seemingly unrelated regressions (other covariates included our IQ measure and our education measures):

$$\begin{aligned} Income &= \alpha_I + \beta_{IA} BigFiveA + \beta_{IC} BigFiveC + \beta_{IO} BigFiveO \\ &\quad + \beta_{IE} BigFiveE + \beta_{IN} BigFiveN + OtherCovariates + \mu_I \end{aligned} \tag{1}$$

$$\begin{aligned} Party &= \alpha_p + \beta_{pA} BigFiveA + \beta_{PC} BigFiveC + \beta_{pO} BigFiveO \\ &\quad + \beta_{pE} BigFiveE + \beta_{pN} BigFiveN + \beta_{pI} Income + OtherCovariates + \mu_P \end{aligned} \tag{2}$$

The coefficient β_{pA} is an estimate then of the direct effect on $Party$ of Agreeableness, controlling for $Income$ and β_{pC}, β_{pO}, β_{pE}, and β_{pN} are similarly defined. Correspondingly, the coefficients on IQ and our education variables measure the direct effect of these on $Party$. To

determine the indirect effect or mediated effect of Agreeableness on $Party$ through $Income$ we multiply the coefficient on Agreeableness in Equation 1, β_{IA} times the coefficient on $Income$ in the Equation 2, β_{pI}. If a mediation effect has occurred, we expect the indirect effect to be nonzero and have the same sign as the direct effect. If a suppression effect has occurred, we expect the indirect effect to be nonzero and to have the opposite sign from the direct effect.[20] As Preacher and Hayes (2004) discuss, statistically evaluating the null hypothesis that the product of these terms is nonzero is a more powerful strategy to establish indirect effects than other procedures that have been suggested as in Baron and Kenny (1986).

Although the estimation of Equations 1 and 2 provides estimates of the standard errors of β_{IA} and β_{pI}, it does not provide an estimate for the standard error of the product of these two parameters. Moreover, the product is likely to be nonnormal and skewed when either a mediation or suppression effect exists. As Shrout and Bolger (2002) discuss, ignoring the skew reduces the power to detect mediation or suppression effects. We therefore used bootstrap measures to determine the standard errors and confidence intervals for the indirect effect $\beta_{IA}*\beta_{pI}$ as developed by Efron and Tibshirani (1993) and described in Appendix A of Shrout and Bolger. We used similar procedures to determine the direct and indirect effects of the other Big Five variables as well as IQ and our education measures.[21]

In our analysis we compute the indirect effects for each of the personality variables, IQ, and our education measures, treating the other traits as covariates. We therefore assume that there are no interaction effects among the Big Five variables, IQ, and our education measures in determining income. Although we use ordinary least squares for this analysis, we also estimated ordered logit and tobit models of these equations independently with little difference in the qualitative results.

Our estimation strategy assumes that the correlation between μ_I and μ_P is equal to zero. It is well known that if there are common unobserved factors in both equations then our estimates are

[20] See MacKinnon et al. (1995, 2000).
[21] See also Preacher and Hayes (2004).

inaccurate. For instance, part of the effect of the unobserved factor on $Party$ could be attributed to $Income$ even though it has a direct effect on $Party$. An alternative estimation strategy would be to use an instrumental variable approach as in two-stage least squares. However, to do so we would need to make exclusion restrictions, arbitrary assumptions that some of our variables affect $Income$ but not $Party$. For example, one might argue that our education variables could serve as instruments for $Income$, but doing so would mean that we would need to assume that educational attainment has no direct effect on $Party$, contrary to the theoretical arguments that we reviewed previously. Unfortunately, we lack an instrument for $Income$ that is theoretically unlikely to also affect our ideological measures. We see our analysis as a first cut at exploring the possible indirect effects of personality traits, cognitive abilities, and education through $Income$ on ideology. We hope our study will encourage further research using theoretically reasonable instruments to determine if our results are robust to stronger specifications.

We summarize the relationships we expect to find between personality traits, cognitive abilities, education, income, and ideology in our estimations in Table 1 below. We expect to find that changes in personality traits that increase income (with the exception of Agreeableness) also decrease all of our ideological measures both directly and indirectly through their effects on income (Openness, Extraversion, and Emotional Stability). Changes in Agreeableness are expected to have an effect both direct and indirect on our economic policy ideological measures only and changes in Conscientiousness are not expected to have an indirect effect on our ideological measures through income, but a negative direct effect on our ideology measures. In contrast, when IQ levels increase, the direct effect on our ideology measures is expected to be positive, but the indirect effect is expected to be negative because of the effect of IQ on *Income.* We expect that the direct effect of our various educational attainment measures, as compared to vocational education, will lead to a direct positive effect on ideology. The indirect effects through income will be positive for *EduBasic* but negative for more advanced educational attainment because of the effects of educational attainment on income.

Table 1: Expected Relationships

		Big Five						Education (*Voc* Omitted)			
	Income	*O*	*C*	*E*	*A*	*N*	*IQ*	*Basic*	*HS*	*Adv1*	*Adv2*
Income		–	?	+	–	–	+	–	+	+	+
Party & Leftist. (Direct)	–	+	–	–	?	+	+	+	+	+	+
Party & Leftist (Indirect)		+	?	–	?	+	–	+	–	–	–
Econ1 & 2 (Direct)	–	+	–	–	+	+	+	+	+	+	+
Econ1 & 2 (Indirect)		+	?	–	+	+	–	+	–	–	–

5 Results

Determinants of Income

We estimated versions of Equations 1 and 2 for each of our four measures of ideology. Note that the number of observations across estimations varies with the number of subjects who answered each question as discussed above. We also estimated the equations for the common sample of observations of subjects who answered all questions with the same qualitative results. We also find little variation across ideological measures. Furthermore, the means and standard deviations of the variables in the analyses do not vary markedly across samples (see the Appendix).

First we report the results of the effects of personality traits, intelligence, and education on income variables in Table 2 in Equation 1. Since we used four different measures of ideology and estimated separate seemingly unrelated regressions for each measure, we report four different estimations of Equation 1, depending on the ideology measure considered in the seemingly unrelated regression estimation, as identified by the column headings in the table. We find little variation in the coefficients in Equation 1 across ideological measures, although our sample size varies as not all subjects responded to all of the ideological measures, as discussed above. We included the demographic controls discussed above in the estimation and the full results are available from the authors.

Table 2: Determinants of Income (Equation 1)

		Ideological Measure in Equation 2			
		Party	*Leftist*	*Econ1*	*Econ2*
BigFiveO	Coeff.	-0.003	-0.003	-0.003	-0.003
	Std. Err.	0.002	0.002	0.002	0.002
BigFiveC	Coeff.	0.004*	0.004**	0.005**	0.005**
	Std. Err.	0.002	0.002	0.002	0.002
BigFiveE	Coeff.	0.002	0.002	0.002	0.002
	Std. Err.	0.002	0.002	0.002	0.002
BigFiveA	Coeff.	-0.01**	-0.01***	-0.01***	-0.01***
	Std. Err.	0.002	0.002	0.002	0.002
BigFiveN	Coeff.	-0.01***	-0.01***	-0.01***	-0.01***
	Std. Err.	0.002	0.002	0.002	0.002
IQ	Coeff.	0.01**	0.01**	0.01**	0.01***
	Std. Err.	0.004	0.004	0.004	0.004
EduBasic	Coeff.	-0.13***	-0.12***	-0.12***	-0.13***
	Std. Err.	0.04	0.04	0.04	0.04
EduHS	Coeff.	-0.08	-0.05	-0.06	-0.06
	Std. Err.	0.05	0.05	0.05	0.05
EduAdv1	Coeff.	0.01	0.01	0.02	0.01
	Std. Err.	0.05	0.04	0.04	0.04
EduAdv2	Coeff.	0.16***	0.16***	0.16***	0.16***
	Std. Err.	0.03	0.03	0.03	0.03
EduAv3	Coeff.	0.32***	0.33***	0.32***	0.33***
	Std. Err.	0.04	0.03	0.03	0.03
Observations		1893	2028	2107	2106
R-Squared		0.61	0.61	0.61	0.61

Note: EduVoc Omitted, Demographic Controls Included. ***Sig. at 1% level, **Sig. at 5% level, *Sig. at 1% level.

In order to determine whether the estimated relationships are meaningful, we also estimated the size of the effects of changes in our principal independent variables in Table 3 below. Given our log specification, these effect sizes report the percentage change in income as a consequence of a change in one standard deviation of our non-dummy variables and as a consequence of a one-unit change in our dummy variables (the education attainment measures).

Table 3: Estimated Percentage Change in Income

	Ideological Measure in Equation 2			
	Party	*Leftist*	*Econ1*	*Econ2*
Std. Dev. Change In:				
BigFiveO	-1.65%	-1.75%	-1.63%	-1.79%
BigFiveC	2.04%	2.44%	2.64%	2.57%
BigFiveE	1.22%	1.23%	1.35%	1.52%
BigFiveA	-2.73%	-2.83%	-2.71%	-2.89%
BigFiveN	-4.11%	-4.24%	-4.37%	-4.19%
IQ	2.70%	2.65%	2.73%	2.82%
Change from 0 to 1:				
EduBasic	-13.67%	-12.49%	-13.21%	-14.01%
EduHS	-9.68%	-7.29%	-7.90%	-8.47%
EduAdv1	-1.74%	-1.34%	0.18%	-0.80%
EduAdv2	15.25%	16.08%	16.19%	16.19%
EduAv3	34.70%	36.74%	35.90%	36.57%

Note: EduVoc Reference Group.

Our results show support for some of the previous work that finds a relationship between personality traits and income. We find robust evidence that higher levels of Emotional Stability (lower levels of *BigFiveN*) lead to significantly higher levels of income for all the measures of ideology. A standard deviation change in Emotional Stability has the largest effect on ideology as compared to our other personality trait measures, leading to a little over a 4% decrease in income. We also find that significantly higher levels of Agreeableness (higher values of *BigFiveA*) lead to significantly lower levels of income (a standard deviation change in Agreeableness leads to an almost 3% decrease in income). Surprisingly we find no significant effects on income of higher levels of Openness (higher values of *BigFiveO*) or of Extraversion (higher values of *BigFiveE)*, in contrast to previous studies, across all ideological measures. Furthermore, we find unexpectedly that higher levels of Conscientiousness (higher values of *BigFiveC*) significantly increases income for three of our measures of ideology (the relationship is significant at the 10% level when we use our *Party* ideological measure), which is also contrary to previous work, but consistent with theoretical expectations. A standard deviation change in Conscientiousness leads to an approximate 2.5% increase in income.

In keeping with previous empirical work and theoretical expectations we find that higher values of *IQ* significantly increase income across ideological measures. A standard deviation increase in Intelligence leads to an almost 3% increase in income. We moreover find that differences in academic educational attainment has a significant effect on income, across our ideological measures, with vocational education (our omitted category, *EduVoc*) equivalent in the effect on income of academic educational attainment of one level above high school education (*EduAdv1*) and as those who have completed high school (*EduHS*). Individuals with only a basic education make significantly less than those with a vocational education, while those with the most advanced education (*EduAdv2* and *EduAdv3*) make significantly more. The effects of education are also sizeable, individuals with only a basic education make around 13% less than those with a vocational education and those with advanced education make around 16% more for *EduAdv2* and 35% more for *EduAdv3*.

Direct Effects on Ideology

We now turn to the results in estimating ideology in the four versions of Equation 2 which is summarized in Table 4 below. The coefficients in this table report the direct effects on each ideology measure of each of the variables listed. Recall that our ideological measures are constructed such that higher values represent more leftist ideological preferences.

Table 4: Determinants of Ideology (Direct Effects)

		Ideological Measure in Equation 2			
		Party	*Leftist*	*Econ1*	*Econ2*
Income	Coeff.	-0.52***	-0.51***	-0.24**	-0.27***
	Std. Err.	0.11	0.09	0.10	0.09
BigFiveO	Coeff.	0.06***	0.06***	0.04***	0.02***
	Std. Err.	0.01	0.01	0.01	0.01
BigFiveC	Coeff.	-0.04***	-0.05***	-0.02**	-0.02***
	Std. Err.	0.01	0.01	0.01	0.01
BigFiveE	Coeff.	-0.01	-0.01	0.01	-0.02***
	Std. Err.	0.01	0.01	0.01	0.01
BigFiveA	Coeff.	0.09***	0.09***	0.09***	0.06***
	Std. Err.	0.01	0.01	0.01	0.01
BigFiveN	Coeff.	0.03***	0.02***	0.03***	0.03***
	Std. Err.	0.01	0.01	0.01	0.01
IQ	Coeff.	-0.001	0.01	-0.03	-0.02
	Std. Err.	0.02	0.02	0.02	0.02
EduBasic	Coeff.	0.25	0.14	0.06	-0.02
	Std. Err.	0.18	0.15	0.16	0.14
EduHS	Coeff.	0.31	0.33	0.54**	0.60***
	Std. Err.	0.26	0.21	0.23	0.20
EduAdv1	Coeff.	-0.12	-0.21	-0.29	0.06
	Std. Err.	0.23	0.18	0.20	0.17
EduAdv2	Coeff.	0.99***	0.72***	0.33***	0.36***
	Std. Err.	0.15	0.12	0.13	0.11
EduAv3	Coeff.	0.65***	0.73***	0.02	0.04
	Std. Err.	0.18	0.15	0.16	0.14
Observations		1893	2028	2107	2106
R-Squared		0.19	0.21	0.12	0.14

Note: Controls Included, *EduVoc* omitted. ***Sig. at 1% level, **Sig. at 5% level, *Sig. at 1% level.

As above, we also report estimated sizes of the effects of a standard deviation change in personality traits and *IQ* on our ideological measures in Table 5 below. Since our variable *Income* is logged, the effect size is nonlinear for changes in non-logged income. We report the effect sizes for a one standard deviation change for income at the 25th percentile, 50th percentile, and 75th percentile. Notice that the effect size dimensions with increases in relative income, which is reasonable. For our educational measures the size of the effects of a one-unit change in these dummy variables are straightforwardly seen from the coefficients in the regressions.

Table 5: Estimated Direct Effect on Leftwing Preferences

	Ideological Measure in Equation 2			
One Standard Deviation Change In:	*Party*	*Leftist*	*Econ1*	*Econ2*
Non-Logged Income at 25th percentile	-0.43	-0.41	-0.19	-0.22
Non-Logged Income at 50th percentile	-0.32	-0.31	-0.14	-0.16
Non-Logged Income at 75th percentile	-0.26	-0.25	-0.12	-0.13
BigFiveO	0.36	0.35	0.23	0.12
BigFiveC	-0.23	-0.28	-0.11	-0.12
BigFiveE	-0.04	-0.03	0.04	-0.15
BigFiveA	0.51	0.50	0.52	0.32
BigFiveN	0.18	0.14	0.20	0.23
IQ	-0.002	0.02	-0.08	-0.05

Note: Recall *Party* measured on a 1-9 scale, others on a 1-10 scale.

Not surprisingly, and in keeping with previous research, we find that income has a significant and negative relationship with all four of our ideological measures, although the effect is twice as high for our overall ideological measures than for our economic policy measures. We also find, as in previous research, that increases in Openness (higher values of *BigFiveO*), decreases in Conscientiousness (lower values of *BigFiveC*) and Emotional Stability (higher values of *BigFiveN*), have the direct effect of leading to higher levels of leftist preferences across our ideological measures. Furthermore, we find that the size of the effect of a change in personality traits is comparable to the size of the effect of a change in income, as found by Gerber et al. (2010), which is notable given the strong validity of our income data.

However, we find some differences from previous research. Notably, we find that Extraversion (*BigFiveE*) has no apparent direct effect on our ideology measures with the exception of *Econ2*, where we find the expected negative relationship[22] and that higher levels of Agreeableness (*BigFiveA*) have a significantly positive direct effect on all four of our ideology measures, not just the ones related to economic policy. Recall that Gerber et al. found that higher levels of Agreeableness had an ambiguous effect on overall ideological preferences, leading to more rightwing preferences on social policy measures but more leftwing preferences on economic policy measures. Our contrary finding may arise because of contextual differences in how Danes

[22]Gerber et al similarly find that Extraversion has no significant effect on their ideology measures.

think of overall ideology as compared to United States citizens.

In another difference from previous research we find little evidence of a direct effect of intelligence on ideology; the estimated direct effect is not significantly different from zero for all four of our ideology measures. Thus, for Danes there seems to be little direct effect of intelligence on ideological preferences, once we control for the indirect effect through income. Furthermore, we find that the direct effect of differences in education for those who have less than advanced academic education of the second level (*EduAdv2*) is not significant for our general measures of ideology, *Party* and *Leftist* – implying that the direct effect of education on ideological preferences is roughly equivalent for those who have a basic education or just a high school education to those who have advanced education of the first level or vocational training.

We find that advanced academic training of the second and third levels (*EduAdv2* and *EduAdv3*) does have a significantly positive direct effect on ideological preferences for our overall measures of ideology (*Party* and *Leftist*). These results suggest that university training does make one more likely to express leftist ideological preferences. We find mixed results with respect to our two measures of economic policy preferences – individuals with advanced academic training of level 2 are significantly more likely in the direct effect to be leftist on these measures as compared to those with vocational training only, but there is no significant difference in the direct effect between those of advanced academic training of level 3 and those with vocational training. Furthermore, the size of these direct effects of education are relatively small given that they are roughly equivalent to a standard deviation change in personality traits.

Indirect Effects on Ideology

The direct effects of personality traits, intelligence, and education on ideological preferences are interesting, but our main contribution is our investigation of the indirect effects through income, which are provided in Tables 6a and b below. Table 6a presents the results for ideological measures *Party* and *Leftist* and Table 6b presents the results for *Econ1* and *Econ2*. As noted in the previous Section, we use bootstrap standard errors (with 5,000 bootstrap-samples for

each estimation) and corrected for bias in computing the reported 95% confidence intervals of the indirect effects.[23] As Efron and Tibshirani (1993) explain, standard percentile confidence intervals tend to be too narrow. Thus we use the bias corrected bounds which take into account the asymmetries in the distributions of the bootstap estimates.

Table 6a: Indirect Effects on General Ideology Measures

	Observed Coeff.	Bias	Bootstrap Std. Err.	95% Conf. Interval	
Indirect Effects on *Party* Through Income					
BigFiveO	-0.001387	-0.000082	0.001077	-0.000387	0.003957
BigFiveC	-0.001881	-0.000032	0.001477	-0.005100	0.000770
BigFiveE	-0.000993	-0.000084	0.001124	-0.003296	0.001138
BigFiveA	0.002543	0.000187	0.001586	-000385	0.005856
BigFiveN	0.003025**	0.000039	0.001318	0.000806	0.006102
IQ	-0.004873**	0.000027	0.002360	-0.010654	-0.001144
EduBasic	0.066467**	0.001884	0.025862	0.024308	0.124577
EduHS	0.039120	0.002452	0.038116	-0.028246	0.119574
EduAdv1	-0.0028533	0.000378	0.023802	-0.047191	0.047853
EduAdv2	-0.0811668**	-0.002263	0.024635	-0.135999	-0.040448
EduAdv3	-0.1637223**	-0.004804	0.044243	-0.255137	-0.084168
Indirect Effects on *Leftist* Through Income					
BigFiveO	0.001466	-0.000139	0.001005	-0.000195	0.003837
BigFiveC	-0.002236	-0.000027	0.001393	-0.005212	0.000309
BigFiveE	-0.000995	-0.000045	0.001033	-0.003058	0.000962
BigFiveA	0.002608**	0.000051	0.001425	0.000006	0.005624
BigFiveN	0.003092**	-0.000080	0.001167	0.001114	0.005864
IQ	-0.004703**	-0.000052	0.002082	-0.009430	-0.001222
EduBasic	0.058990**	-0.001039	0.022386	0.022448	0.111061
EduHS	0.025763	0.001507	0.034691	-0.041003	0.095554
EduAdv1	-0.0042486	-0.004324	0.0211260	-0.039943	0.046876
EduAdv2	-0.0835051**	-0.000335	0.0209906	-0.131273	-0.048663
EduAdv3	-0.1689367**	0.000236	0.0369951	-0.249096	-0.104974

Note: Controls Included, Bias Corrected Confidence Intervals, *EduVoc* ommitted. **Sig. at 5% level established through Confidence Interval Estimation

[23]Given the nonnormal distribution of the test statistic, we do not report other levels of significance.

Table 6b: Indirect Effects on Economic Ideology Measures

	Observed Coeff.	Bias	Bootstrap Std. Err.	95% Conf. Interval	
Indirect Effects on *Econ1* Through Income					
BigFiveO	0.0006332	-0.000047	0.0005419	-0.000086	0.002228
BigFiveC	-0.0011344**	0.000010	0.0008354	-0.003530	-0.000022
BigFiveE	-0.0005088	-0.000032	0.0005656	-0.002088	0.000267
BigFiveA	0.0011688*	0.000063	0.0008202	-0.000039	0.003115
BigFiveN	0.0014513**	0.000011	0.0008674	0.000167	0.003630
IQ	-0.0022535**	-0.000025	0.0014163	-0.005917	-0.000255
EduBasic	0.0295759**	0.000670	0.0168111	0.004496	0.071128
EduHS	0.0136921	0.001486	0.0190377	-0.013462	0.065023
EduAdv1	-0.0055282	-0.002057	0.0103590	-0.028855	0.013251
EduAdv2	-0.0390619**	-0.001335	0.0193690	-0.079462	-0.003554
EduAdv3	-0.0771914**	-0.002887	0.0368808	-0.152094	-0.006279
Indirect Effects on *Econ2* Through Income					
BigFiveO	0.0007967	0.000013	0.0006017	-0.000079	0.002374
BigFiveC	-0.0012595**	-0.000023	0.0008582	-0.003481	-0.000027
BigFiveE	-0.0006509	0.000015	0.0005691	-0.002069	0.000266
BigFiveA	0.0014288**	-0.000012	0.0008323	0.000170	0.003445
BigFiveN	0.0016263**	0.000038	0.0009027	0.000386	0.004007
IQ	-0.0026534**	-0.000029	0.0014067	-0.006294	-0.000620
EduBasic	0.0363183**	-0.000210	0.0154145	0.011936	0.072278
EduHS	0.0172531	-0.000432	0.0193035	-0.014470	0.064562
EduAdv1	-0.0036158	0.000075	0.0115077	-0.029933	0.018067
EduAdv2	-0.0446664**	-0.000797	0.0175279	-0.084117	-0.015628
EduAdv3	-0.0895908**	-0.0008345	0.0333517	-0.016098	-0.028766

Note: Controls Included, Bias Corrected Confidence Intervals, *EduVoc* ommitted. **Sig. at 5% level established through Confidence Interval Estimation

We report estimated sizes of the indirect effects of a standard deviation change in personality traits and *IQ* on our ideological measures through income in Table 7 below. For our educational measures the size of the effects of a one-unit change in these dummy variables are straightforwardly seen from the estimated coefficients in Tables 6a,b.

Table 7: Estimated Indirect Effects on Leftwing Preferences

	Ideological Measure in Equation 2			
One Standard Deviation Change In:	*Party*	*Leftist*	*Econ1*	*Econ2*
BigFiveO	-0.01	0.01	0.004	0.005
BigFiveC	-0.01	-0.01	-0.01	-0.01
BigFiveE	-0.01	-0.01	-0.003	-0.004
BigFiveA	0.01	0.01	0.01	0.01
BigFiveN	0.02	0.02	0.01	0.01
IQ	-0.01	-0.01	-0.01	-0.01

Note: Recall *Party* measured on a 1-9 scale, others on a 1-10 scale.

We expect to find that the indirect effects of personality traits through income will be in the same direction as the direct effects. Indeed, we find that when the indirect effects are significant, the signs of the estimated indirect effects are the same as the signs of the estimated direct effects for our personality trait measures. Emotional Stability has a significant indirect negative effect (lower values of *BigFiveN*) for all four of our ideological measures. Thus, the indirect effect of Emotional Stability on ideological preferences is to lead individuals to express more rightwing preferences, as we also find in the direct effect of this trait on ideology. Agreeableness has a significant positive indirect effect on *Leftist* and *Econ2*. Again, individuals who are more agreeable are more likely to be leftist through both the indirect and the direct effect. Conscientiousness has a significant negative indirect effect on our two economic measures of ideology, *Econ1* and *Econ2*. Hence, conscientious individuals are more likely to express rightwing preferences on economic policies both through the direct effect of this trait on these preferences and the indirect effect through income of this trait on such preferences. Extraversion and Openness have no significant indirect effects which is not surprisingly since they have no significant effects on income levels. However, all of these indirect effects are small, averaging a change of 0.01 in a scale that has a maximum of either 9 or 10, and thus only leading to at most an almost negligible effect on ideological preferences.

With respect to Intelligence and Educational Attainment, we also find significant indirect effects in the predicted directions. In particular, we expect to find that Intelligence increases Income and thus leads to more rightwing ideological positions, which is strongly supported.

However, as with personality traits, the indirect effect is small, only about 0.01. We find that individuals with lower levels of Educational Attainment are significantly more likely to express leftist positions as compared to individuals with more advanced education. Specifically, we find that the effect on ideology of educational differences through effects on income on those whose educational attainment is Basic or High School only is significantly positive for all our ideology measures, such that lower educational attainment does appear to reduce income leading to more leftist positions. Furthermore, we find that for those with advanced academic education beyond level 1, the effect on ideology of educational difference through the effects on income is significantly negative for all four measures of ideology, such that higher educational attainment definitely increases income leading to more rightwing preferences. These indirect effect sizes are somewhat larger than the indirect effect sizes of a standard deviation change in personality traits or *IQ*, for example, individuals with the highest advanced education have an indirect effect size of about 0.16 for our general ideological measures.

Direct and Indirect Effects Compared

The evidence then is fairly robust that income serves as a mediating or suppressing variable for the effects of personality traits, intelligence, and education on ideological preferences, generally as predicted. Given that these indirect effects may amplify or reduce direct effects, it is useful to compare the direct and indirect effects. Such a comparison is provided in Figures 1a,b,c, and d below for the ideological measures *Party, Liberalism, Econ1,* and *Econ2,* respectively, for the individual characteristics which have significant direct or indirect effects (or both) on our ideological measures. If an effect is insignificant, it is given a 0 value.[24] The columns present the proportion of the total effect of each characteristic that is direct and indirect. The portions of the columns that are positive are effects that increase the likelihood of expressing leftist preferences, the portions of the columns that are negative are effects that increase the likelihood of expressing rightwing preferences. The total effects are represented by the sum of

[24]See Shrout and Bolger (2002) for a discussion of a similar measure and justification for assigning a 0 to nonsignificant effects.

the two portions, which always equal 100%. So for example, in Figure 1a which shows the direct and indirect effects of EduAdv3 on Party, we see that the direct effect of post graduate education is positive and leads to an increase in leftist, while the indirect effect of post graduate education through income is negative and leads to a decrease in leftist. The direct effect is 80% of the total effect, while the indirect effect is 20% of the total effect, so the total effect is positive.

Figure 1: Direct and Indirect Effects of Personality Traits, IQ, and Educational Attainment on ideology (Educational Baseline is Vocational Education)

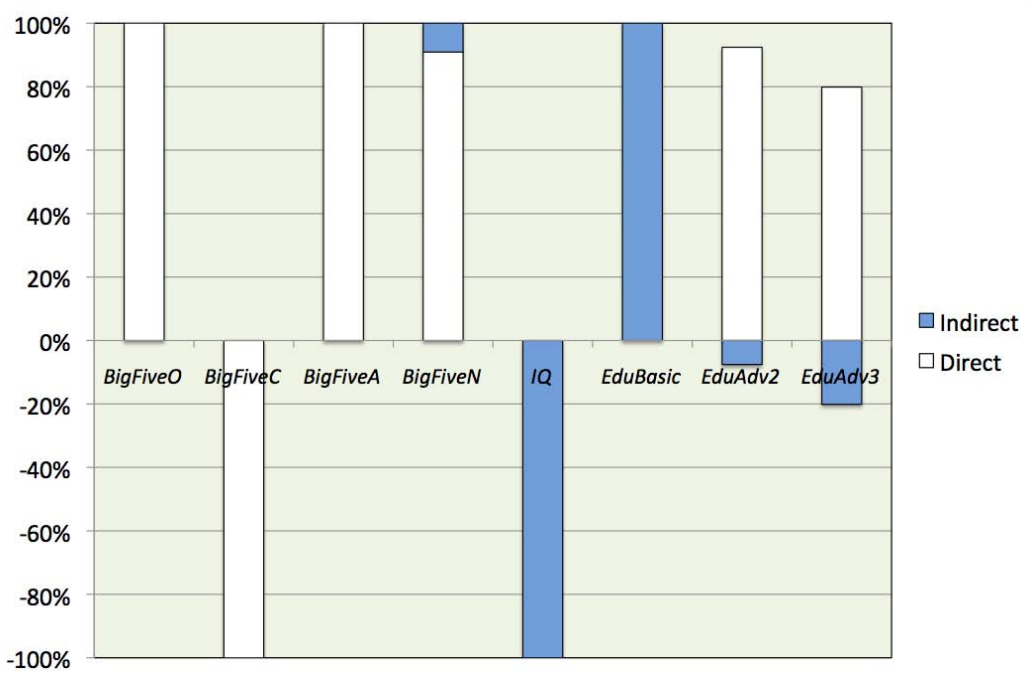


Figure 1a: Effects on *Party*

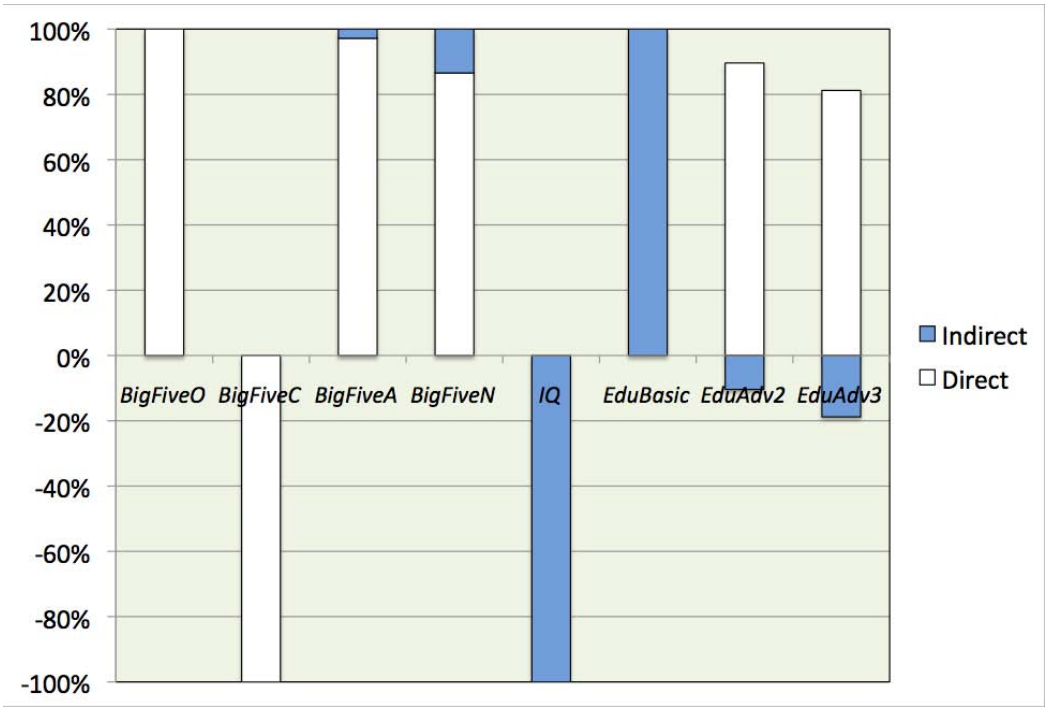


Figure 1b: Effects on *Liberalism*

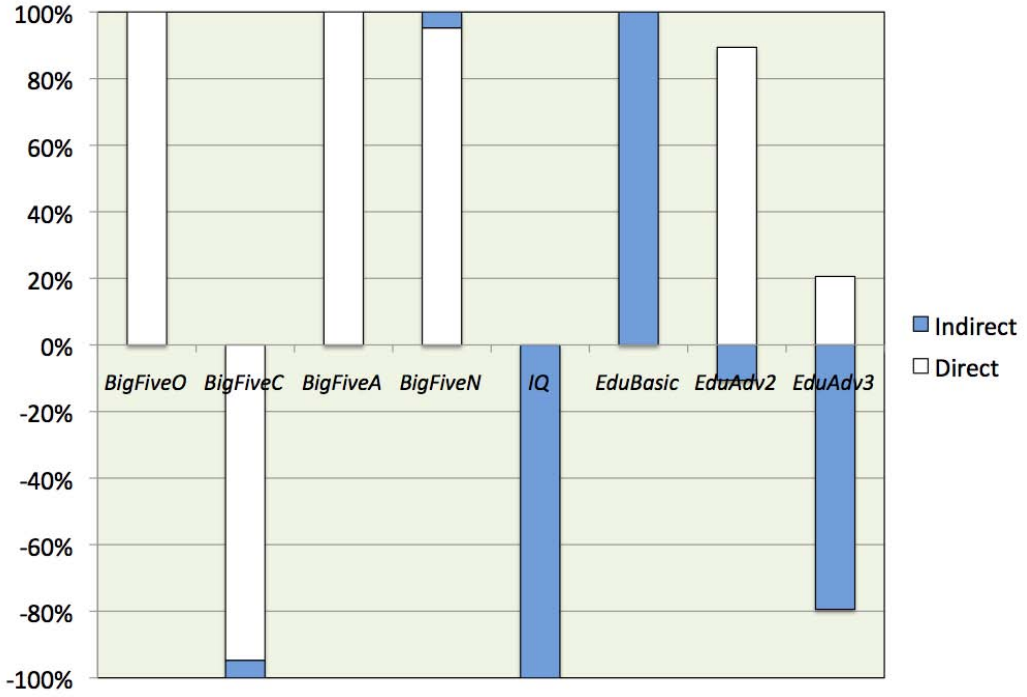


Figure 1c: Effects on *Econ1*

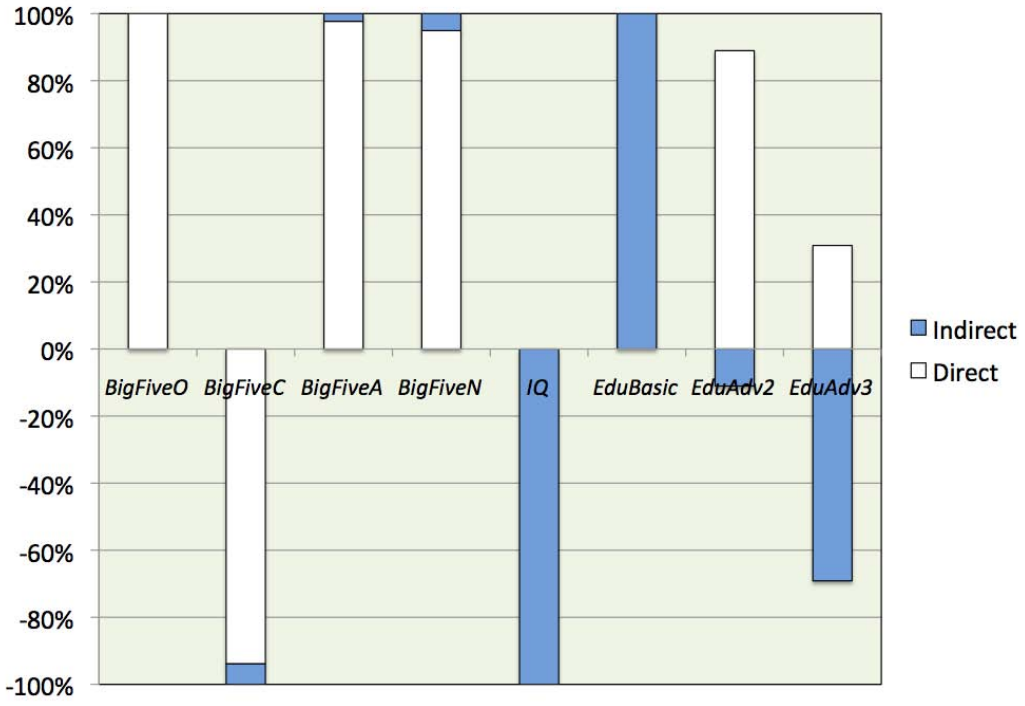


Figure 1d: Effects on *Econ2*

As Figures 1a-d demonstrate, across ideological measures the indirect effects of personality traits through income reinforce the direct effects and are much smaller in comparison to the direct effects. Thus, the main effects of personality traits on ideological preferences are direct ones. For intelligence and basic educational attainment, since the direct effect is not significantly different from zero, the indirect effect is equivalent to the total effect. For intelligence the indirect effect is negative, leading to lower levels of leftist, while for basic educational attainment, the indirect effect is positive, leading to higher levels of leftist.

The indirect effects on our ideological measures for advanced education of a bachelor's degree and beyond are always in the opposite direct of the direct effects, which are also significant. Recall that the comparison is to vocational educational attainment. For the economic measures of ideology, *Econ1* and *Econ2*, these indirect effects strongly outweigh the direct effects of such educational attainment for individuals with post-graduate education, leading these individuals to be more rightwing than those with vocational education only in their responses to ideological questions about economic policy.

6 Discussion

Our analysis demonstrates that income serves to varying degrees as a mediating or suppressing variable between the effects of personality traits, cognitive abilities, and educational attainment and their effects on ideological preferences. We make the following discoveries:

First, we find that personality traits have significant, albeit small, indirect effects on ideological preferences through their effects on income. Specifically, we find that individuals who have higher levels of Emotional Stability are more likely to make higher incomes which indirectly leads these individuals to express more rightwing preferences. We find weaker evidence that Agreeableness has an indirect effect through income on ideological preferences; as expected individuals who are more agreeable make lower incomes and this indirectly leads them to express more leftist preferences. And we find that Conscientiousness has an indirect effect through income on our economic policy measures of ideology; individuals who are more conscientious make higher incomes which leads them to express more rightwing views on economic policies. However, these effects are small relative to the direct effects of these variables on ideological preferences and in the same direction. These results are largely consistent with theoretical expectations and previous empirical research.

Second, we find that intelligence has a significant negative indirect effect on ideological preferences through its effect on income. Controlling for income the direct effect of intelligence on ideological preferences is not significant, so the indirect effect is equivalent to the total effect and thus we find that increasing intelligence increases rightist preferences. This result is contrary to theoretical expectations and previous empirical research. However, the size of the effect is small relative to the direct effects of personality traits on ideology and the direct and indirect effects of educational attainment on ideology.

Third, we find that achievement of advanced education also has significant negative indirect effects on ideological preferences through their effects on income. These effects are large in comparison to the direct effects and in the opposite direction. This result is consistent with

theoretical expectations and previous empirical research.

Our analysis provides new insights into how personality traits, cognitive abilities, and educational attainment affect ideology. In particular, our analysis shows that studies measuring the effects of these individualized characteristics on ideology should take into consideration the role played by income as a mediating or suppressing variable, otherwise the size (and with respect to intelligence, the direction) of these effects may be incorrectly estimated. Our results showing that intelligence through its effect on income can indirectly lead to more rightist preferences calls into question previous theoretical and empirical work that intelligence leads to more leftist ideological preferences. And our research on the indirect effects of variation in educational attainment on ideology through income demonstrates that treating education and income as separate independent variables in analyses of ideological preferences can lead to problematic conclusions.

Finally, our analysis of the effects of the personality traits of Openness, Conscientiousness, and Emotional Stability also show that the previous work on the relationship between personality and ideology has external validity–is robust to consideration by different subject pools and to strong verified income data. Our results on Agreeableness support the contention of Gerber et al. (2010) that contextual differences may complicate the relationship between personality traits and ideological preferences.

7 Appendix: Data Summary & Comparison to Danish Population

In Table A1 we present a summary of the variables used in the analysis. Note that since all subjects did not answer all of the ideology questions, we have different numbers of observations for each ideology question estimation. Thus, we present the means and standard deviations for the variables used in each estimation separately, by ideological question. As the data shows, there is little variation across estimations in these variables.

Table A1: Variables Used in Analysis

	Party Question		*Leftist* Question		*Econ1* Question		*Econ2* Question	
Variable	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
Age	47.04	13.98	47.25	13.91	47.05	13.89	47.07	13.89
Female	0.48	0.50	0.48	0.50	0.49	0.50	0.49	0.50
Urban	0.13	0.33	0.13	0.33	0.13	0.33	0.13	0.33
Church	0.86	0.35	0.86	0.35	0.86	0.35	0.86	0.35
Married	0.63	0.48	0.63	0.48	0.63	0.48	0.63	0.48
Couple	0.11	0.32	0.12	0.32	0.12	0.32	0.12	0.32
Divorced	0.08	0.28	0.08	0.27	0.08	0.28	0.08	0.28
EduBasic	0.12	0.32	0.11	0.32	0.11	0.32	0.11	0.32
EduHS	0.06	0.23	0.06	0.23	0.06	0.23	0.05	0.23
EduAdv1	0.07	0.25	0.07	0.25	0.07	0.25	0.07	0.25
EduAdv2	0.27	0.44	0.27	0.45	0.27	0.44	0.27	0.44
EduAdv3	0.15	0.35	0.15	0.35	0.14	0.35	0.14	0.35
Student	0.13	0.34	0.13	0.33	0.13	0.34	0.13	0.34
Parttime	0.12	0.32	0.12	0.32	0.12	0.32	0.12	0.32
Retired	0.13	0.33	0.13	0.33	0.13	0.33	0.13	0.33
Unemployed	0.09	0.28	0.08	0.28	0.08	0.28	0.08	0.28
Income	12.47	0.76	12.48	0.75	12.47	0.75	12.47	0.75
BigFiveA	32.40	5.56	32.41	5.54	32.43	5.53	32.43	5.52
BigFiveC	33.00	5.63	33.01	5.57	33.00	5.56	33.00	5.56
BigFiveE	30.61	6.36	30.53	6.35	30.52	6.34	30.51	6.35
BigFiveN	19.01	7.04	19.00	7.01	19.07	7.02	19.07	7.03
BigFiveO	27.24	6.16	27.28	6.12	27.17	6.14	27.16	6.14
IQ	8.85	2.88	8.86	2.88	8.86	2.89	8.86	2.89
Party	5.06	2.57						
Leftist			5.59	2.21				
Econ1					5.17	2.26		
Econ2							4.08	1.98
Observations	1893		2028		2107		2106	

Table A2 below compares our subjects to the Danish population 18 years old and older. Again, we present separate comparisons for the set of subjects who answered each of the four ideological questions. Note that the Danish census numbers are measured for those who have completed a given educational level and thus we report from our survey the comparison numbers, which are slightly different from those used in the analysis which classifies individuals in an educational category if they have completing or are in the process of completing a particular level. Unfortunately we do not have comparison numbers from the Danish population for our personality trait measures and *IQ*. In fact, the Danish Psychological Publishing Company agreed partly to allow us to use their measures in order to provide them with better population estimates of these traits.

Table A2: Comparison to Danish Population

Characteristic	Danish Population	Ideological Measure			
		Party	*Leftist*	*Econ1*	*Econ2*
Gender					
Women	50.2%	48.0%	47.6%	48.8%	48.8%
Age					
18-30	20.2%	14.3%	13.5%	13.3%	13.9%
31-40	19.0%	17.3%	16.8%	16.8%	17.5%
41-50	19.6%	26.9%	25.5%	25.5%	27.5%
51-60	17.8%	23.2%	23.6%	23.6%	23.2%
61-70	15.0%	14.1%	15.0%	15.1%	13.8%
71-80	8.4%	4.1%	5.7%	5.7%	4.1%
Education					
Basic (up to 10 years)	26.3%	11.8%	11.4%	11.3%	11.4%
High School (up to 12 years)	6.4%	5.7%	5.7%	5.5%	5.5%
Vocational (up to 12 years)	39.1%	34.2%	34.0%	34.9%	34.9%
Short Tertiary (less than 3 years)	5.4%	6.7%	7.0%	6.8%	7.0%
Medium Tertiary (between 3 & 4 years)	15.7%	27.0%	27.3%	27.0%	26.8%
Long Tertiary (more than 4 years)	7.2%	14.5%	14.7%	14.5%	14.4%
Income (DKK per year)					
less than 100,000	13.7%	8.8%	8.7%	8.7%	8.8%
100,000-199,999	26.2%	16.7%	16.4%	16.8%	16.7%
200,000-299,999	23.2%	24.9%	25.1%	25.5%	25.4%
300,000-399,999	20.0%	26.2%	26.3%	26.3%	26.4%
more than 400,000	16.9%	23.3%	23.5%	22.7%	22.7%
Church Membership					
Member of the state church	82.7%	85.8%	85.7%	86.0%	86.0%

Note: Gender and Age is based on individuals aged 18-80. Education is based on individuals aged 18-69. The education variables for the survey include ongoing education, but these figures are for completed education only. Church members is based on individuals aged 20-79.

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